



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,155	02/05/2004	Rahul N. Manepalli	42P13856D	7283

7590 09/02/2005

Michael A. Bernadicou  
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP  
Seventh Floor  
12400 Wilshire Boulevard  
Los Angeles, CA 90025

EXAMINER

DOLAN, JENNIFER M

ART UNIT PAPER NUMBER

2813

DATE MAILED: 09/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/774,155

**Applicant(s)**

MANEPALLI ET AL.

**Examiner**

Jennifer M. Dolan

**Art Unit**

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 12-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Objections*

1. Claim 19 is objected to because of the following informalities: “modified” should be replaced by --modifier--.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 12, 14, and 17-19 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,757,967 to Jimarez et al.

Regarding claim 12, Jimarez discloses providing a first substrate (10); predetermining a device placement location for a second substrate (36) to be coupled to the first substrate (see figures 3-4; ‘holes’ are predetermined positions for second substrates); predetermining a flow modifier height (height of 18 and 26) at least equal to the spacing between the substrates (see figure 4); coupling a flow modifier to the first substrate (figures 1-3); coupling the second substrate to the first substrate at the device placement location (figure 4); applying a first

Art Unit: 2813

molding compound (42) over the second substrate (figure 7); and applying a second molding compound (38) between the substrates (figure 5).

Regarding claim 14, Jimarez discloses applying a low pressure over the substrates (column 2, lines 34-40).

Regarding claim 17, Jimarez discloses applying the second molding compound between the substrates (figure 5) before applying the first molding compound over the second substrate (figure 7).

Regarding claim 18, Jimarez discloses depositing the flow modifier before coupling the second substrate to the first substrate (see figures 1-4).

Regarding claim 19, Jimarez discloses that the flow modifier is placed substantially around the device placement areas (figures 1-3).

4. Claims 12, 17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,583,378 to Marrs et al.

Regarding claim 12, Marrs discloses a method comprising: providing a first substrate (404K, 404L); predetermining a device placement location for a second substrate (402K, 402L; placement of the dam (407) automatically ‘predetermines’ the placement location for the second substrate; see figures 4k and 4L); predetermining a flow modifier height at least equal to a distance from the bottom surface of a second substrate to a top surface of the first substrate (see figures 4C, 4D, 4K, 4L); coupling a flow modifier (407) to the first substrate substantially around the device placement location (see figures 4B-4D; 4K, 4L) and extending to a height substantially equal to the predetermined flow modifier height (height of dam 407 is greater than

Art Unit: 2813

the gap between the substrates; see the cited figures); coupling the second substrate to the first substrate (figures 4C, 4D, 4K, 4L); applying a first molding compound (461K, 401L) over the second substrate (figures 4K, 4L); and applying a second molding compound (426K) between the first and second substrates (figures 4K, 4L).

Regarding claim 17, Marrs discloses that the second molding compound is applied between the first and second substrates before the first molding compound is applied over the second substrate (column 16, lines 18-58; figures 4D, 4K, 4L; Marrs states that prior to the lid attachment, and hence, prior to the attachment of molding layer 461K, the device looks like figure 4D).

Regarding claim 19, Marrs discloses that the flow modifier is placed substantially around the device placement locations (figure 4B).

5. Claims 12, 13, 15, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,324,069 to Weber.

Regarding claim 12, Weber discloses providing a first substrate (14); predetermining a device placement location for a second substrate (12) to be coupled to the first substrate (column 5, lines 12-30; placement of bonding pads ‘predetermines’ the location of the second substrate); predetermining a flow modifier (29) height (‘D’; column 5, lines 30-36; figures 7, 7a); the height at least equal to the spacing between the substrates (figures 7, 7a); coupling the flow modifier to the first substrate substantially around the device placement location (figures 7, 7a; column 6, lines 22-30); coupling the second substrate to the first substrate (figures 7, 7a; column 6, lines 30-40); applying a first molding compound over the second substrate (16; portion extending

Art Unit: 2813

across the sides and top of the second substrate; see figure 7a); and applying a second molding compound (16; portion underfilling the first substrate) between the first and second substrates (column 6, lines 20-27 shows separation of the molding regions).

Regarding claim 13, Weber discloses a flow modifier height within the claimed range (column 5, lines 30-35; figure 7a – flow modifier height = D).

Regarding claim 15, Weber discloses that the first and second molding compounds are applied in a single step (column 5, lines 35-50; column 6, lines 16-30).

Regarding claim 19, Weber discloses that the flow modifier is placed substantially around the device placement locations (column 6, lines 7-30).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weber in view of U.S. Patent No. 6,048,656 to Akram et al.

Weber teaches depositing the underfill encapsulant (corresponding to the claimed ‘second molding compound’) in the same step as the outer encapsulant (corresponding to the claimed ‘first molding compound’).

Weber does not suggest depositing the first molding compound before depositing the second molding compound (i.e., performing the outer encapsulation before underfilling).

Art Unit: 2813

Akram discloses completely sealing the exterior of a chip with encapsulant material (corresponding to the claimed first molding compound; 120, 125; column 6, lines 1-10) before performing the underfilling (column 2, lines 13-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Weber, such that the underfilling step is performed after the outer encapsulation step, as suggested by Akram. The rationale is as follows: A person having ordinary skill in the art would have been motivated to perform the underfilling step after the outer encapsulation, because encapsulating the substrate first will create a seal for the underfilling step, thus enabling greater uniformity and control of the underfilling step and allowing for the usage of a broader range of underfilling materials, such as low or high viscosity encapsulants (see Akram, column 3, lines 1-20; column 5, lines 45-60; column 6, lines 40-67).

### ***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,841,194 to Tsukamoto teaches an alternate arrangement for using a dam structure to control the flow of encapsulating materials.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

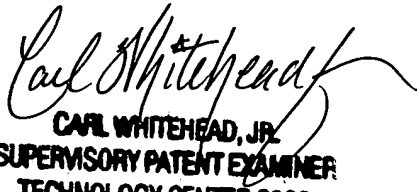
Art Unit: 2813

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan  
Examiner  
Art Unit 2813

jmd

  
CARL WHITEHEAD, JR.  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800